

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 16 November 2000 (16.11.00)	
International application No. PCT/CA00/00309	Applicant's or agent's file reference 380-02-03
International filing date (day/month/year) 23 March 2000 (23.03.00)	Priority date (day/month/year) 31 March 1999 (31.03.99)
Applicant DUNNE, Patrick, F.	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 30 October 2000 (30.10.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

BEST AVAILABLE COPY

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Charlotte ENGER Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

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NOTIFICATION RELATING TO PRIORITY CLAIM

(PCT Rules 26bis.1 and 26bis.2 and
Administrative Instructions, Sections 402 and 409)

From the INTERNATIONAL BUREAU

To:

FURMAN, Cory
Furman & Kallio
P.O. Box 20010
Regina, Saskatchewan S4P 4J7
CANADA

Date of mailing (day/month/year) 26 May 2000 (26.05.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 380-02-03	
International application No. PCT/CA00/00309	International filing date (day/month/year) 23 March 2000 (23.03.00)
Applicant NP INDUSTRIES INC. et al	

BEST AVAILABLE COPY

The applicant is hereby **notified** of the following in respect of the priority claim(s) made in the international application.

- ☒ **Correction of priority claim.** In accordance with the applicant's notice received on: 11 April 2000 (11.04.00), the following priority claim has been corrected to read as follows:
CA 31 March 1999 (31.03.99) 2,267,677
☐ even though the indication of the number of the earlier application is missing.
☐ even though the following indication in the priority claim is not the same as the corresponding indication appearing in the priority document:
- ☐ **Addition of priority claim.** In accordance with the applicant's notice received on: , the following priority claim has been added:
☐ even though the indication of the number of the earlier application is missing.
☐ even though the following indication in the priority claim is not the same as the corresponding indication appearing in the priority document:
- ☐ As a result of the correction and/or addition of (a) priority claim(s) under items 1 and/or 2, the (earliest) priority date is:
- ☐ **Priority claim considered not to have been made.**
☐ The applicant failed to respond to the Invitation under Rule 26bis.2(a) (Form PCT/IB/316) within the prescribed time limit.
☐ The applicant's notice was received after the expiration of the prescribed time limit under Rule 26bis.1(a).
☐ The applicant's notice failed to correct the priority claim so as to comply with the requirements of Rule 4.10.
 The applicant may, before the technical preparations for international publication have been completed and subject to the payment of a fee, request the International Bureau to publish, together with the international application, information concerning the priority claim. See Rule 26bis.2(c) and the PCT Applicant's Guide, Volume I, Annex B2(II).
- ☐ In case where **multiple priorities** have been claimed, the above item(s) relate to the following priority claim(s):
- A copy of this notification has been sent to the receiving Office and
☒ to the International Searching Authority (where the international search report has not yet been issued).
☒ the designated Offices (which have already been notified of the receipt of the record copy).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer Christine Carrié Telephone No. (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 380-02-03	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/CA 00/ 00309	International filing date (day/month/year) 23/03/2000	(Earliest) Priority Date (day/month/year) 31/03/1999
Applicant NP INDUSTRIES INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

CA 00/00309

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C02F1/52 B01D21/00 B01J19/24 C02F1/30 C02F1/76

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B01D B01J C02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98 38134 A (GATTINGER VERN JOHN ;MANZ DAVID HAROLD (CA); PROTEUS ENVIRONMENTAL) 3 September 1998 (1998-09-03) page 6, paragraph 3 -page 7, paragraph 1; figure 3 abstract	1-3,8, 10-15, 19-27, 29, 42-48, 52-54, 56,57, 59,60,62
A	US 4 357 242 A (CHANDLER CHARLES R) 2 November 1982 (1982-11-02) figure 3 --- -/--	1-3, 10-14, 19,20, 24,43-48

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

17 July 2000

Date of mailing of the international search report

03/08/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Gruber, M

INTERNATIONAL SEARCH REPORT

International Application No

F CA 00/00309

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 833 865 A (HARATO TAKUO ET AL) 10 November 1998 (1998-11-10) abstract; figure 2 ---	1, 43
A	EP 0 787 686 A (WESUMAT GMBH) 6 August 1997 (1997-08-06) the whole document ---	1, 3, 42-46
A	US 3 933 642 A (WILSON GEORGE E) 20 January 1976 (1976-01-20) abstract; figure 3 ---	7, 9
A	US 5 556 537 A (SAARENKETO TAPIO) 17 September 1996 (1996-09-17) figure 6 ---	7, 9
A	CA 2 212 503 A (KIDD WILLIAM J) 27 November 1997 (1997-11-27) the whole document ---	26, 28, 53, 55
A	US 4 219 415 A (NASSEF N A ET AL) 26 August 1980 (1980-08-26) the whole document -----	39

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 00/00309

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9838134	A	03-09-1998	US 5904855 A AU 6085298 A	18-05-1999 18-09-1998
US 4357242	A	02-11-1982	NONE	
US 5833865	A	10-11-1998	AU 674214 B AU 6474494 A BR 9402422 A CA 2125792 A EP 0629424 A JP 7060009 A	12-12-1996 22-12-1994 17-01-1995 17-12-1994 21-12-1994 07-03-1995
EP 0787686	A	06-08-1997	AT 174875 T DE 59601042 D	15-01-1999 04-02-1999
US 3933642	A	20-01-1976	NONE	
US 5556537	A	17-09-1996	CA 2083538 A	24-05-1994
CA 2212503	A	27-11-1997	US 5938918 A	17-08-1999
US 4219415	A	26-08-1980	NONE	

TENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

FURMAN, Cory
Furman & Kallio
P.O. Box 20010
Regina, Saskatchewan S4P 4J7
CANADA

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing
(day/month/year) 08.06.2001

Applicant's or agent's file reference
380-02-03

IMPORTANT NOTIFICATION

International application No.
PCT/CA00/00309

International filing date (day/month/year)
23/03/2000

Priority date (day/month/year)
31/03/1999

Applicant
CARSON WATER SYSTEMS LTD. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

DOCKETING	
Furman & Kallio - Regina, Canada	
DKT:	<i>P</i>
VER:	<i>P</i>
SCAN:	<i>P</i>
OTN:	

Name and mailing address of the IPEA/

 European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d

Authorized officer

Michaleczek, N



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference 380-02-03	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/CA00/00309	International filing date (day/month/year) 23/03/2000	Priority date (day/month/year) 31/03/1999
International Patent Classification (IPC) or national classification and IPC C02F1/52		
Applicant CARSON WATER SYSTEMS LTD. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
 - ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 9 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 30/10/2000	Date of completion of this report 08.06.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Veronesi, S Telephone No. +49 89 2399 8348 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/00309

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-17 as originally filed

Claims, No.:

1-61 with telefax of 21/02/2001

Drawings, sheets:

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/CA00/00309

- ☐ the drawings, sheets:
5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-61
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-61
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-61
	No:	Claims	

2. Citations and explanations
see separate sheet

Re It m V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The document D1 - US-A-4 357 242 (CHANDLER CHARLES R) 2 November 1982 - describes (cf. Fig. 3) the removal of solids from a fluid in an apparatus comprising a pump (51), a first chamber (10) operatively connected to the pump (51) via a first stage fluid transfer conduit, said first chamber having a base and a top and including a solids discharge at its base, a second chamber (10a) operatively attached to the top of the first chamber via a second stage fluid transfer conduit and having a solids discharge at its base, a chemical injection apparatus operatively attached to the second stage fluid transfer conduit and a separated fluid discharge from the second chamber.
2. Present method and apparatus differ from those of D1 in that the entire apparatus and process are in a pressurized environment.
3. It appears that the application provides a simpler apparatus and process for removal of solids from fluids. The apparatus can be placed in-line in a fluid transfer system. The pressure in the system forces the fluid through the apparatus and the solids out. In the prior art several pumps are required to keep the fluid moving through the system.

CLAIMS:

I claim:

1. A fluid treatment apparatus for the removal of solids from fluids, said apparatus comprising:
 - a) a pumping apparatus;
 - b) an equalization chamber operatively attached to said pumping apparatus via a first stage fluid transfer conduit, said equalization chamber having a base and a top and including an equalization solids discharge at the base of the equalization chamber;
 - c) a clarification chamber operatively attached to the top of the equalization chamber via a second stage fluid transfer conduit, said clarification chamber having a base and a top and including a clarification solids discharge at the base of the clarification chamber;
 - d) a second stage chemical injection apparatus operatively attached to the second stage fluid transfer conduit;
 - e) a separated fluid discharge from clarification chamber;

wherein raw fluid containing solids suspended therein is pumped by the pumping apparatus into the equalization chamber where a portion of the solids contained in the raw fluid, being equalization recovered solids, can settle to the base of the equalization chamber for removal via the equalization solids discharge, the raw fluid then becoming partially separated fluid which moves into the second stage fluid transfer conduit where chemical can be injected into the partially separated fluid by the second stage chemical injection apparatus

before the arrival of said partially separated fluid in the clarification chamber where solids remaining in the partially separated fluid can settle to the base of the clarification chamber for removal via the clarification solids discharge, the separated fluid then being discharged from the clarification chamber by the separated fluids discharge;

and wherein the fluid treatment apparatus between the pumping apparatus and the separated fluids discharge is pressurized, by the pumping apparatus.

2. The apparatus of Claim 1 further comprising a first stage fluid transfer conduit operatively connecting the pumping apparatus and the equalization chamber.
3. The apparatus of Claim 2 further comprising first stage chemical injection apparatus operatively connected to the first stage fluid transfer conduit between the pumping apparatus and the equalization chamber.
4. The apparatus of Claim 3 wherein the first stage chemical injection apparatus is a mazi injector.
5. The apparatus of Claim 1 wherein the second stage chemical injection apparatus is a mazi injector.
6. The apparatus of Claim 2 wherein the first stage fluid transfer conduit provides a mixing area for the raw fluid before entering into the equalization chamber.
7. The apparatus of Claim 2 wherein the first stage fluid transfer conduit is wrapped around the equalization chamber before entering the equalization chamber.
8. The apparatus of Claim 1 wherein the second stage fluid transfer conduit provides a mixing area for the partially separated fluid before entry into the

clarification chamber.

9. The apparatus of Claim 1 wherein the second stage fluid transfer conduit is wrapped around the clarification chamber before entering the clarification chamber.
10. The apparatus of Claim 2 wherein the interior of the first stage fluid transfer conduit is fitted with internal flighting to provide for agitation or mixing of the raw fluid before entry into the equalization chamber.
11. The apparatus of Claim 1 wherein the interior of the second stage fluid transfer conduit is fitted with internal flighting to provide for agitation or mixing of the partially separated fluid before entry into the clarification chamber.
12. The apparatus of Claim 1 further comprising a decoupling tank operatively connected to the separated fluid discharge.
13. The apparatus of Claim 1 wherein the equalization solids discharge is a valve.
14. The apparatus of Claim 1 wherein the clarification solids discharge is a valve.
15. The apparatus of Claim 1 further comprising downstream solids sterilization apparatus operatively connected to the equalization solids discharge and the clarification solids discharge.
16. The apparatus of Claim 15 wherein the downstream solids sterilization apparatus is a pasteurizer.
17. The apparatus of Claim 15 wherein the downstream solids sterilization apparatus is a storage tank.

18. The apparatus of Claim 15 wherein the downstream solids sterilization apparatus is a digester.
19. The apparatus of Claim 1 wherein the pumping apparatus is a pump.
20. The apparatus of Claim 1 wherein the pumping apparatus is a plurality of pumps.
21. The apparatus of Claim 1 further comprising a grinder ahead of the pumping apparatus to grind the raw fluid in advance of pumping.
22. The apparatus of Claim 21 wherein the grinder and the pumping apparatus are combined as a grinding pump.
23. The apparatus of Claim 21 wherein the grinder and the pumping apparatus are combined as a plurality of grinding pumps.
24. The apparatus of Claim 1 further comprising downstream fluids processing apparatus operatively attached to the separated fluid discharge.
25. The apparatus of Claim 24 wherein the downstream fluids processing apparatus comprises:
 - a) a sand filter;
 - b) a biological treatment filter; and
 - c) an ultraviolet disinfection unit.
26. The apparatus of Claim 24 wherein the downstream fluids processing apparatus is a sand filter.

27. The apparatus of Claim 24 wherein the downstream fluids processing apparatus is a biological treatment filter.
28. The apparatus of Claim 24 wherein the downstream fluids processing apparatus is a chlorinator.
29. The apparatus of Claim 24 wherein the downstream fluids processing apparatus is an ultraviolet disinfection unit.
30. The apparatus of Claim 1 further comprising a settlement reservoir operatively attached to the pumping apparatus for the collection and storage of raw fluid in advance of pumping into the equalization chamber.
31. The apparatus of Claim 1 further comprising a raw fluid collection system.
32. The apparatus of Claim 31 wherein the raw fluid collection system is a gravity collection system.
33. The apparatus of Claim 31 wherein the raw fluid collection system is a vacuum collection system.
34. The apparatus of Claim 2 wherein the first stage fluid transfer conduit enters the equalization chamber at an angle such that raw fluid entering the equalization chamber is directed towards or against the inner wall of the equalization chamber.
35. The apparatus of Claim 34 wherein the equalization chamber is approximately cylindrical in shape.

36. The apparatus of Claim 1 wherein the second stage fluid transfer conduit enters the clarification chamber at an angle such that raw fluid entering the clarification chamber is directed towards or against the inner wall of the clarification chamber.
37. The apparatus of Claim 36 wherein the clarification chamber is approximately cylindrical in shape.
38. The apparatus of Claim 15 wherein the downstream solids sterilization apparatus comprises a gravity settling tank in which the solids are allowed to settle for a period of time, after which the thickened solids are treated biologically in a digester, yielding digested solids.
39. The apparatus of Claim 15 wherein the downstream solids sterilization apparatus is a microwave treatment unit.
40. The apparatus of Claim 1 wherein the clean fluid yielded is potable water.
41. The apparatus of Claim 1 wherein the raw fluid used is groundwater.
42. The apparatus of Claim 1 wherein the raw fluid used is waste water.
43. A method of processing raw fluid to remove solids suspended therein, said method comprising:
 - a) pumping raw fluid into an equalization chamber, and allowing a portion of the solids suspended in said raw fluid to settle to the base of said equalization chamber for removal;
 - b) pumping this partially separated fluid from the equalization chamber

into a clarification chamber, and injecting chemicals into said partially separated fluid before it enters said clarification chamber;

- c) allowing remaining solids suspended in said partially separated fluid to settle to the base of said clarification chamber for removal; and
- d) removing separated fluid from the clarification chamber

wherein the entire process up to the point of exit from the clarification chamber is conducted in a pressurized environment.

- 44. The method of Claim 43 further comprising injecting chemicals into the raw fluid before entry into the equalization chamber.
- 45. The method of Claim 43 wherein the solids are removed at the base of the equalization chamber via an equalization solids discharge.
- 46. The method of Claim 43 wherein the solids are removed at the base of the clarification chamber via a clarification solids discharge.
- 47. The method of Claim 43 further comprising mixing the raw fluid in advance of entry into the equalization chamber.
- 48. The method of Claim 43 further comprising mixing the partially separated fluid in advance of entry into the clarification chamber.
- 49. The method of Claim 43 further comprising sterilizing the removed solids by pasteurization.
- 50. The method of Claim 43 further comprising sterilizing the removed solids by digestion.

51. The method of Claim 43 further comprising grinding the raw fluid and the suspended solids therein to a manageable size before pumping the raw fluid into the equalization chamber.
52. The method of Claim 43 further comprising cleaning the separated fluid by sand filtration, biological filtration, and finally by ultraviolet disinfection.
53. The method of Claim 43 further comprising cleaning the separated fluid by sand filtration.
54. The method of Claim 43 further comprising cleaning the separated fluid by biological filtration.
55. The method of Claim 43 further comprising cleaning the separated fluid by chlorination.
56. The method of Claim 43 further comprising cleaning the separated fluid by ultraviolet disinfection.
57. The method of Claim 43 further comprising sterilizing the removed solids.
58. The method of Claim 57 wherein the removed solids are sterilized within a pressurized environment.
59. The method of Claim 57 wherein the removed solids are sterilized in a non-pressurized environment.
60. The method of Claim 43 further comprising further cleaning of the separated fluid.

61. The method of Claim 60 wherein the separated fluid is further cleaned in a pressurized environment.
62. The method of Claim 60 wherein the separated fluid is further cleaned in a non-pressurized environment.

09/937787

JC05 Rec'd PCT/PTO 2 8 SEP 2001

CLAIMS:

I claim:

1. A fluid treatment apparatus for the removal of solids from fluids, said apparatus comprising:
 - a) a pumping apparatus (10);
 - b) an equalization chamber (15) operatively attached to said pumping apparatus (10) via a first stage fluid transfer conduit (11), said equalization chamber having a base (16) and a top (17) and including an equalization solids discharge (18) at the base of the equalization chamber;
 - c) a clarification chamber (23) operatively attached to the top of the equalization chamber via a second stage fluid transfer conduit (19), said clarification chamber having a base (24) and a top (25) and including a clarification solids discharge (26) at the base of the clarification chamber;
 - d) a second stage chemical injection apparatus (20) operatively attached to the second stage fluid transfer conduit;
 - e) a separated fluid discharge (27) from clarification chamber;

wherein raw fluid containing solids suspended therein is pumped by the pumping apparatus into the equalization chamber where a portion of the solids contained in the raw fluid, being equalization recovered solids, can settle to

the base of the equalization chamber for removal via the equalization solids discharge, the raw fluid then becoming partially separated fluid which moves into the second stage fluid transfer conduit where chemical can be injected into the partially separated fluid by the second stage chemical injection apparatus before the arrival of said partially separated fluid in the clarification chamber where solids remaining in the partially separated fluid can settle to the base of the clarification chamber for removal via the clarification solids discharge, the separated fluid then being discharged from the clarification chamber by the separated fluids discharge;

and wherein the fluid treatment apparatus between the pumping apparatus and the separated fluids discharge is pressurized, by the pumping apparatus.

2. The apparatus of Claim 1 further comprising first stage chemical injection apparatus (12) operatively connected to the first stage fluid transfer conduit between the pumping apparatus and the equalization chamber.
3. The apparatus of Claim 2 wherein the first stage chemical injection apparatus is a mazi injector.
4. The apparatus of Claim 1 wherein the second stage chemical injection apparatus is a mazi injector.
5. The apparatus of Claim 1 wherein the first stage fluid transfer conduit provides a mixing area (13) for the raw fluid before entering into the equalization chamber.
6. The apparatus of Claim 1 wherein the first stage fluid transfer conduit is wrapped around the equalization chamber before entering the equalization chamber.

7. The apparatus of Claim 1 wherein the second stage fluid transfer conduit provides a mixing area (21) for the partially separated fluid before entry into the clarification chamber.
8. The apparatus of Claim 1 wherein the second stage fluid transfer conduit is wrapped around the clarification chamber before entering the clarification chamber.
9. The apparatus of Claim 1 wherein the interior of the first stage fluid transfer conduit is fitted with internal lighting (14) to provide for agitation or mixing of the raw fluid before entry into the equalization chamber.
10. The apparatus of Claim 1 wherein the interior of the second stage fluid transfer conduit is fitted with internal lighting (14) to provide for agitation or mixing of the partially separated fluid before entry into the clarification chamber.
11. The apparatus of Claim 1 further comprising a decoupling tank operatively connected to the separated fluid discharge.
12. The apparatus of Claim 1 wherein the equalization solids discharge is a valve.
13. The apparatus of Claim 1 wherein the clarification solids discharge is a valve.
14. The apparatus of Claim 1 further comprising downstream solids sterilization apparatus (29) operatively connected to the equalization solids discharge and the clarification solids discharge.
15. The apparatus of Claim 14 wherein the downstream solids sterilization apparatus is a pasteurizer.

16. The apparatus of Claim 14 wherein the downstream solids sterilization apparatus is a storage tank.
17. The apparatus of Claim 14 wherein the downstream solids sterilization apparatus is a digester.
18. The apparatus of Claim 1 wherein the pumping apparatus is a pump.
19. The apparatus of Claim 1 wherein the pumping apparatus is a plurality of pumps.
20. The apparatus of Claim 1 further comprising a grinder (30) ahead of the pumping apparatus to grind the raw fluid in advance of pumping.
21. The apparatus of Claim 20 wherein the grinder and the pumping apparatus are combined as a grinding pump.
22. The apparatus of Claim 20 wherein the grinder and the pumping apparatus are combined as a plurality of grinding pumps.
23. The apparatus of Claim 1 further comprising downstream fluids processing apparatus operatively attached to the separated fluid discharge.
24. The apparatus of Claim 23 wherein the downstream fluids processing apparatus comprises:
 - a) a sand filter;
 - b) a biological treatment filter; and

- c) an ultraviolet disinfection unit.
25. The apparatus of Claim 23 wherein the downstream fluids processing apparatus is a sand filter.
26. The apparatus of Claim 23 wherein the downstream fluids processing apparatus is a biological treatment filter.
27. The apparatus of Claim 23 wherein the downstream fluids processing apparatus is a chlorinator.
28. The apparatus of Claim 23 wherein the downstream fluids processing apparatus is an ultraviolet disinfection unit.
29. The apparatus of Claim 1 further comprising a scum reservoir (9) operatively attached to the pumping apparatus for the collection and storage of raw fluid in advance of pumping into the equalization chamber.
30. The apparatus of Claim 1 further comprising a raw fluid collection system.
31. The apparatus of Claim 30 wherein the raw fluid collection system is a gravity collection system.
32. The apparatus of Claim 30 wherein the raw fluid collection system is a vacuum collection system.
33. The apparatus of Claim 1 wherein the first stage fluid transfer conduit enters the equalization chamber at an angle such that raw fluid entering the equalization chamber is directed towards or against the inner wall of the

equalization chamber.

34. The apparatus of Claim 33 wherein the equalization chamber is approximately cylindrical in shape.
35. The apparatus of Claim 1 wherein the second stage fluid transfer conduit enters the clarification chamber at an angle such that raw fluid entering the clarification chamber is directed towards or against the inner wall of the clarification chamber.
36. The apparatus of Claim 35 wherein the clarification chamber is approximately cylindrical in shape.
37. The apparatus of Claim 14 wherein the downstream solids sterilization apparatus comprises a gravity settling tank in which the solids are allowed to settle for a period of time, after which the thickened solids are treated biologically in a digester, yielding digested solids.
38. The apparatus of Claim 14 wherein the downstream solids sterilization apparatus is a microwave treatment unit.
39. The apparatus of Claim 1 wherein the clean fluid yielded is potable water.
40. The apparatus of Claim 1 wherein the raw fluid used is groundwater.
41. The apparatus of Claim 1 wherein the raw fluid used is waste water.
42. A method of processing raw fluid to remove solids suspended therein, said method comprising:

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- a) pumping raw fluid (2) into an equalization chamber (15), and allowing a portion of the solids (3) suspended in said raw fluid to settle to the base (16) of said equalization chamber for removal;
- b) pumping this partially separated fluid (4) from the equalization chamber into a clarification chamber (23), and injecting chemicals into said partially separated fluid before it enters said clarification chamber;
- c) allowing remaining solids (3) suspended in said partially separated fluid to settle to the base (24) of said clarification chamber for removal; and
- d) removing separated fluid (5) from the clarification chamber

wherein the entire process up to the point of exit from the clarification chamber is conducted in a pressurized environment.

- 43. The method of Claim 42 further comprising injecting chemicals into the raw fluid before entry into the equalization chamber.
- 44. The method of Claim 42 wherein the solids are removed at the base of the equalization chamber via an equalization solids discharge (18).
- 45. The method of Claim 42 wherein the solids are removed at the base of the clarification chamber via a clarification solids discharge (26).
- 46. The method of Claim 42 further comprising mixing the raw fluid in advance of entry into the equalization chamber.
- 47. The method of Claim 42 further comprising mixing the partially separated fluid in advance of entry into the clarification chamber.

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48. The method of Claim 42 further comprising sterilizing the removed solids by pasteurization.
49. The method of Claim 42 further comprising sterilizing the removed solids by digestion.
50. The method of Claim 42 further comprising grinding the raw fluid and the suspended solids therein to a manageable size before pumping the raw fluid into the equalization chamber.
51. The method of Claim 42 further comprising cleaning the separated fluid by sand filtration, biological filtration, and finally by ultraviolet disinfection.
52. The method of Claim 42 further comprising cleaning the separated fluid by sand filtration.
53. The method of Claim 42 further comprising cleaning the separated fluid by biological filtration.
54. The method of Claim 42 further comprising cleaning the separated fluid by chlorination.
55. The method of Claim 42 further comprising cleaning the separated fluid by ultraviolet disinfection.
56. The method of Claim 42 further comprising sterilizing the removed solids.
57. The method of Claim 56 wherein the removed solids are sterilized within a pressurized environment.

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58. The method of Claim 56 wherein the removed solids are sterilized in a non-pressurized environment.
59. The method of Claim 42 further comprising further cleaning of the separated fluid.
60. The method of Claim 59 wherein the separated fluid is further cleaned in a pressurized environment.
61. The method of Claim 60 wherein the separated fluid is further cleaned in a non-pressurized environment.